

Appl. No. 10/709,311
Amdt. dated September 28, 2005
Reply to Office action of June 29, 2005

REMARKS/ARGUMENTS

Claims 1-4 and 7-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Mori (US 6,842,224). Claims 5 and 6 are objected to but would be allowable if rewritten
5 in independent form.

1. Rejections of claims 1-4 and 7-11 under 35 U.S.C. 102(e):

Claims 1-4 and 7-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Mori (US 6,842,224). Mori teaches an aperture plate (200) that has a light-intercepting
10 region having a reference center point (in center), a horizontal reference line and a vertical reference line that both go through the center; and a light transmitting region having four pole apertures (see Fig.2), two of the pole apertures are positioned on the horizontal reference line and the two pole apertures are positioned on the vertical reference line. There is a symmetric pattern aperture positioned in the central area as
15 indicated with those apertures that are within the outer pattern. The pole apertures are equidistant, since they are formed around the center. The apertures are square or rectangle as shown in Fig.2. As shown in Fig.3, the apertures can be round.

Response:

20 According to Fig.1 of the present application, the aperture plate is an application of off-axis illumination (OAI) method, *wherein the aperture plate 18 is located in front of light source of a lithography system for blocking vertical incident light to increase the resolution and depth of focus (DOF) in an off-axis illumination system of the lithography process (para.[0005], and para.[0006]). As shown in Fig.1, the aperture plate (or called*
25 *pupil plate) 18 is obviously different from the photomask (or reticle) 22 for defining element or device patterns onto a target material (the wafer 24), wherein the photomask or reticle 22 is used to provide device patterns, such as contact holes, which will be*

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transferred to the object through the lithography process.

Claim 1 is listed below for further describing the differences between the present application and the prior art:

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Claim 1: "An aperture plate for lithography systems capable of improving normalized image log slope (NILS) comprising :

a light-intercepting region comprising :

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a reference center point defined on the light-intercepting region;

a horizontal reference line intersecting the reference center point; and

a vertical reference line intersecting the reference center point; and

a light-transmitting region comprising:

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four pole apertures, two of the pole apertures being positioned on the horizontal reference line and the other two pole apertures being positioned on the vertical reference line, wherein the four pole apertures define a central area; and

at least a symmetric pattern aperture positioned in the central area, the symmetric pattern aperture having a symmetric center overlapping the reference center point."

According to claim 1, one of the main characteristics of the present application is that
20 the aperture plate comprises four pole apertures positioned in the periphery area of the aperture plate and at least a symmetric pattern aperture positioned in the central area of the aperture plate. Therefore, *the aperture plate of the present application includes two groups of patterns in a periphery area and a central area of the aperture plate respectively, wherein one of the groups of patterns in the periphery area includes four*
25 *circular apertures and another group of patterns in the central area includes a symmetric pattern aperture near to the reference center point.* Therefore, vertical incident light near the reference center point, from the light source, is able to pass through the aperture plate via the symmetric pattern aperture and that brings an advantage that the image contrast

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and resolution of CD are improved. As a result, the performance of the lithography process for semiconductor products with high integration can be improved (para. [0009]).

The application of Mori provides an exposure (lithography) method for exposing a
5 reticle 200 having a plurality of contact-hole patterns 210 and a plurality of auxiliary
patterns 220 with shapes similar to the contact-hole patterns 210 (Fig.2, claim 1) and for
transferring the contact-hole patterns 210 onto an object (col.8, lines 31-56). Mori teaches
positioning the object at a defocus position which has a specific distance D from a focus
position so that the exposure has a high resolution and the auxiliary patterns 220 will not
10 be transferred to the object (col.7, lines 19-55). In another word, the object of Mori is
positioned at a position offset from a focus position. *Accordingly, the reticle 200 is a
photomask for providing device patterns, such as contact-hole patterns, which will be
transferred to the object. Therefore, the reticle 200 is the same as the photomask 22 in
Fig.1 of the present application, but apparently not the aperture plate 18 claimed in the*
15 *present application.* Thus the applicant believes that the patterns of devices or auxiliary
patterns of the reticle 200 of Mori cannot be compared to the apertures of the aperture
plate 18 of the present application.

Mori mentions to use off-axis illumination in an optical system, including a pupil
20 intensity distribution, such as a quadrupole distribution with circular apertures A at biased
positions as shown in Fig.3, a quadrupole distribution with a circular aperture B and
rectangular light-shielding part C as shown in Fig.4, and an annular distribution with an
annular aperture D as shown in Fig.5 (col.8, lines 16-23). However, *Mori never teaches
providing an asymmetric pattern aperture in the central area of the aperture plate in his*
25 *specification or the above-mentioned figures. In fact, the aperture plates in Mori's*
application do not have any apertures or openings near their reference center points so
that no vertical light from light source can pass through the aperture plates. Furthermore,
Mori never teaches his aperture plate has two groups of aperture patterns in a periphery

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area and in a central area of the aperture plate respectively. Accordingly, the pupil distributions cannot improve the resolution of the lithography process in an off-axis illumination application. Thus the applicant believes Mori doesn't teach all the limitations in claim 1 of the present application and alleges that claim 1 should be allowable.

5 Therefore, reconsideration of claim 1 is politely requested.

Similarly, since the article 200 of Mori only provides device patterns and is not related to apertures or pupil distributions of the aperture plates or pupil plates in off-axis illumination applications at all, the applicant believes the pattern in the article 200 of Mori cannot be compared to the pattern aperture s of the aperture plate claimed by the present application. Therefore, Mori does not teach providing an aperture plate that includes any asymmetric pattern aperture in a central area and four circular apertures in a periphery area of the aperture plate at the same time. Accordingly, Mori does not disclose all the limitations in each of claims 2-11, and claims 2-11 should be allowable.

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15 Reconsideration of claims 2-11 is respectfully requested.

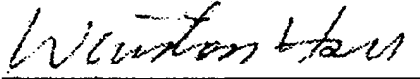
Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Sincerely yours,



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